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PRELIMINARY FORECASTS AND PROJECTIONS FOR 1979 ALASKAN SALMON FISHERIES

Prepared by:

Division of Commercial Fisheries
ALASKA DEPARTMENT OF FISH AND GAME

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ABSTRACT

In 1978 commercial fishermen harvested 80 million salmon in Alaska, the largest catch since 1943.

A commercial salmon harvest of 72 million fish is projected for Alaska in 1979. The statewide catch is not expected to be less than 50 million nor more than 100 million fish. Based on projection experience since 1970, only 1 of 4 realized harvests would fall outside this range.

Increased catches of pink salmon are expected in Prince William Sound and Chignik, and more sockeye are anticipated in Bristol Bay, but a smaller pink harvest is forecast in southern Southeast Alaska. Kodiak pink salmon runs are normally smaller in odd-numbered years, and odd-year pink runs are negligible in Western Alaska.

INTRODUCTION

This is the tenth in a series of annual reports prepared by the Division of Commercial Fisheries, Alaska Department of Fish and Game, presenting salmon return forecasts and harvest projections for Alaska's commercial salmon fisheries. These reports are released in December to make the information available to the Board of Fisheries and the fishing industry well before the season begins.

In order to provide forecast information at this time it has been necessary to utilize preliminary harvest and return data from the 1978 season. In the past, forecasts and projections based on final harvest and return data have differed little from the preliminary results.

Projections of statewide commercial salmon harvests have been published yearly since 1969. Table 1 summarizes the accuracy of these projections. On the average, the projections have been too low by 1.5 million fish, or 3% of the average realized commercial harvest.* Projection errors stem from imprecise knowledge of salmon escapements, numbers of fry or smolt produced and estuarine and marine survival.

Salmon harvest projections have been below realized harvests every year since 1974, when the statewide salmon catch reached a low of 22 million fish. Beginning in 1975, salmon harvests have consistently increased, at an average rate of 37% compounded annually. While the Department continues to strive for increased salmon production by improving management techniques and implementing applied fisheries research programs, it would be foolhardy to expect the recovery of Alaska's salmon runs to proceed without hesitation. Favorable environmental conditions following the harsh winters of 1971 and 1972 have certainly been partially responsible for the recent improvement in salmon production.

Terminology and Definitions

Salmon return or run:	The total number of mature salmon returning in a given year from ocean rearing areas to coastal waters.
Escapement, spawning population or brood stock:	That portion of a salmon run which is not harvested and survives to reach the spawning grounds.

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* Without regard to sign, the mean error was 11.6 million fish, 27% of the average harvest.

Forecast:	Forecast harvest and returns are calculated using information such as parent-year escapements, subsequent fry abundance, spring sea water temperatures and escapement requirements.
Harvest Projection:	Harvest projections are averages of recent harvests. They may be modified subjectively when qualitative escapement or other relevant information is available. Only harvests are projected, and harvest projections are given only for salmon runs which are not forecast.

TABLE 1. PROJECTED AND REALIZED ALASKA COMMERCIAL SALMON HARVEST, WITH ABSOLUTE AND RELATIVE ERRORS, 1970-1978.

(Number of fish in millions)

Season	(1) Projected harvest	(2) Actual harvest	(3) Error: (1) - (2)	(4) Relative Error (% of Actual Harvest) (3)/(2) X 100%
1970	91.5	68.5	23.0	34%
1971	41.5	47.5	-6.0	-13%
1972	46.7	32.0	14.7	46%
1973	30.0	22.3	7.7	35%
1974	15.6	21.8	-6.2	-28%
1975	19.9	26.2	-6.3	-24%
1976	37.1	44.4	-7.3	-16%
1977	34.7	50.8	-16.1	-32%
1978	62.9	80.2 a/	-17.3	-22%
TOTAL	379.9	393.7	-13.8 (104.6) b/	
1970-78 Average	42.2	43.7	-1.5 (11.6) b/	-3% (27%) b/

a/ Preliminary data. Compiled 11/30/78.

b/ Values in parentheses are the sum or average of errors without regard to sign.

Alaska Pacific Salmon Species

Scientific Name	Common Name
Oncorhynchus tshawytscha	chinook, king
Oncorhynchus nerka	sockeye, red
Oncorhynchus kisutch	coho, silver
Oncorhynchus gorbuscha	pink, humpy, humpback
Oncorhynchus keta	chum, dog

Primary Brood Years Contributing to the 1979 Salmon Return[a/]

Species	Age of Returning Salmon in Years				
	2	3	4	5	6
Pink	1977				
Chum		1976	1975		
Coho		1976	1975		
Sockeye			1975	1974	1973
Chinook			1975	1974	1973

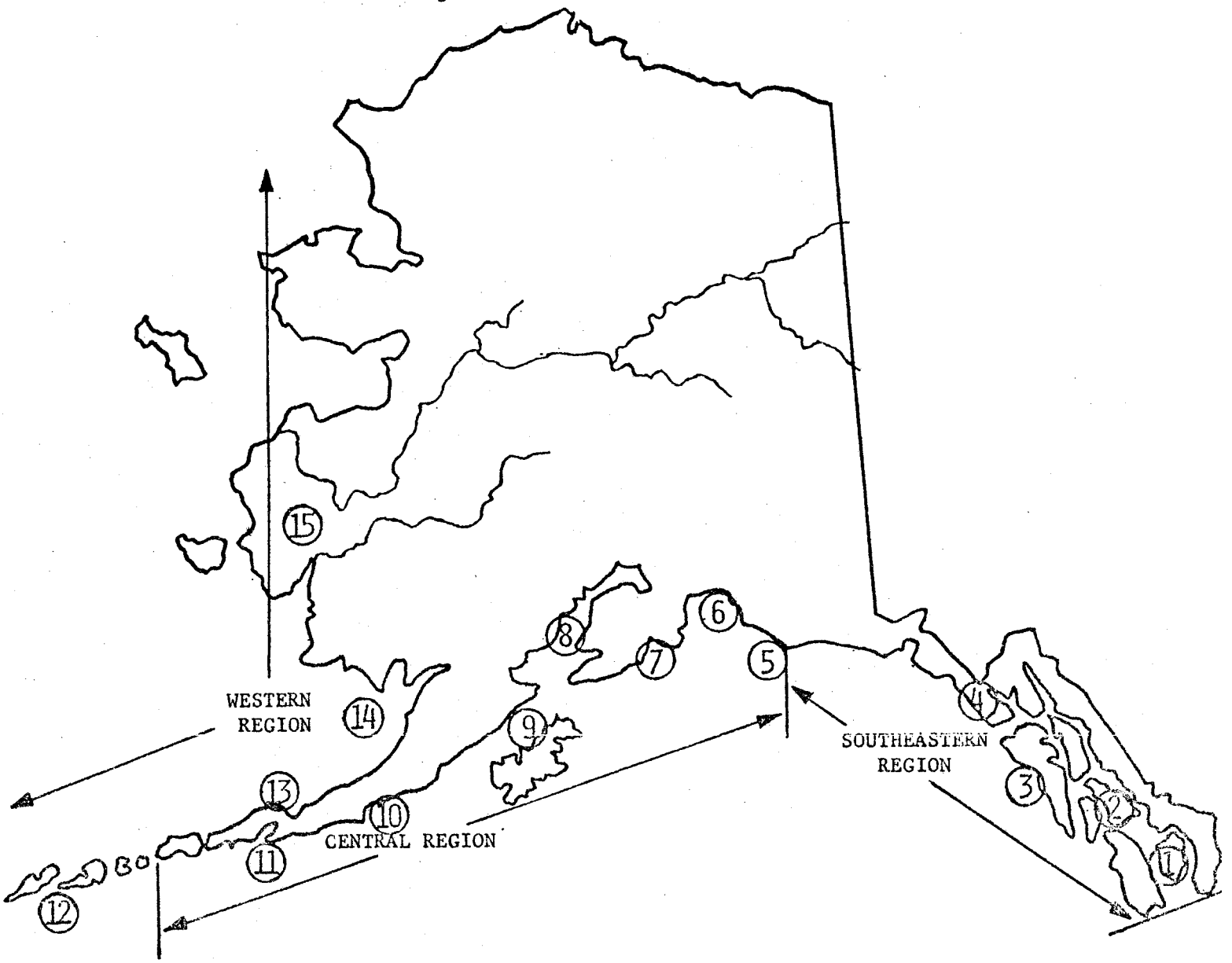
a/ The age classes listed for each species generally comprise more than 90% of the run.

The boundaries of and major fishing areas in the Southeastern, Central and Western statistical regions are shown in Figure 1. These regions and areas are the ones used in the Department's statistical leaflet series and in prior statistical reports.

Acknowledgments

Materials presented in this report were prepared by Division of Commercial Fisheries biologists located in field offices throughout the state. Area biologists, not individually identified, contributed the materials for the review of the 1978 fishing season. Individual credit for forecast material is given with the area forecast discussions in the Appendix.

Figure 1. Alaska Department of Fish and Game Commercial Fisheries Statistical Regions.



REGIONS:

SOUTHEASTERN ALASKA:	Dixon Entrance to Cape Suckling
CENTRAL ALASKA:	Cape Suckling to Scotch Cap on the southwestern tip of Unimak Island
WESTERN ALASKA:	The Aleutian Islands west of Scotch Cap and the Bering Sea north through Kotzebue Sound

AREAS:

1. Ketchikan
2. Petersburg-Wrangell
3. Sitka
4. Juneau-Yakutat
5. Copper-Bering Rivers
6. Prince Wm. Sound
7. Resurrection Bay
8. Cook Inlet
9. Kodiak
10. Chignik
11. South Peninsula
12. Aleutian Islands
13. North Peninsula
14. Bristol Bay
15. Arctic-Yukon-Kuskokwim

REVIEW OF THE 1978 SEASON

A preliminary estimate of the 1978 Alaskan commercial salmon harvest is 80.2 million fish, the largest since 1943. The catch was above the projection of 63 million issued by the Department in 1977, but well within the projected range of from 40 to 100 million.

Statewide, harvests of chinook, sockeye and coho salmon were about 50% larger than had been anticipated. Pink and chum catches were also above but closer to levels projected in 1977. In Southeastern Alaska, the chum take was again disappointing, but coho and chinook catches were more than 50% above expectations. Prince William Sound experienced generally poor sockeye returns, but an unexpectedly strong coho run. Cook Inlet, Kodiak, Chignik and South Peninsula pink and sockeye salmon returns were mostly very strong. Similarly, Western Alaska pink and sockeye runs were remarkably large, in some cases permitting record harvests. Table 2 compares actual and forecast 1978 salmon returns for selected fisheries, and Table 3 details the 1978 statewide salmon harvest by species and area.

Southeastern Alaska

The Southeastern Alaska harvest of 20 million pink salmon in 1978 was less than 10% above the Department's 1977 projection; the forecast pink return of 27.1 million was realized almost exactly. Nearly 90% of the harvest was taken in southern districts, where escapements were generally on-target and evenly distributed. Pink catches in northern Southeast continued to improve in comparison with recent years, to 2.5 million fish in 1978. Catches were particularly good in Tenakee Inlet and Peril Straits. Escapements were also good in these areas, but only fair throughout the remaining northern districts despite extensive fishing closures. Southeast pinks were unusually small in 1978.

Southeastern sockeye harvests were mixed. In the south the Tree Point drift net fishery did well, and in the north sockeye returns to the Yakutat area were strong. Elsewhere, sockeye catches were disappointing and fishing was curtailed.

Troll catches of both chinook and coho salmon were large in 1978. Troll closures in inside waters to encourage depressed Alaskan chinook stocks were again implemented, and Prince of Wales District gill net fisheries were restricted to daylight hours, which reduced the incidental chinook catch.

TABLE 2. COMPARISON OF ACTUAL[a] AND FORECAST 1978 SALMON RETURNS, WITH ABSOLUTE AND RELATIVE ERRORS, FOR SOME MAJOR ALASKAN SALMON FISHERIES[b].

(Number of fish in thousands)

Area	Species	(1) Harvest[a]	(2) Escapement[a]	(3) Return[a] (1) + (2)	(4) Forecast return	(5) Error: (4) - (3)	(6) Relative Error: (5)/(3) X 100%
Southern Southeastern	Pink	17,500	5,100	22,600	22,100	-500	- 2%
Northern Southeastern		2,500	2,400	4,900	5,000	100	2%
Southeastern Subtotal		20,000	7,500	27,500	27,100	-400	- 1%
Prince William Sound	Pink	2,800	1,100	3,900	4,400	500	13%
	Chum	490	160	650	640	- 10	- 2%
Cook Inlet-Southern and Outer Districts	Pink	350	130	480	640	160	33%
Kodiak	Pink	15,000	4,000	19,000	14,100	-4,900	-26%
Chignik	Sockeye	1,600	680	2,280	1,700	-580	-25%
	Pink	980	950	1,930	2,700	770	40%
Bristol Bay	Sockeye	9,700	10,000	19,700	11,500	-8,200	-42%
	Pink	5,200	8,600	13,800	3,200	-10,600	-77%
South Peninsula	Pink	5,800	2,900	8,700	4,300	-4,400	-51%
Total		61,920	36,020	97,940	70,280	-27,660	-28%

a/ Preliminary data
b/ Compiled 11/30/78

TABLE 3. PRELIMINARY 1978 ALASKA COMMERCIAL SALMON HARVEST BY SPECIES AND FISHING AREA[a/]

(Number of fish in thousands)

AREA	SPECIES					
	Chinook	Sockeye	Coho	Pink	Chum	All
Troll, Southeast	373	3	1,093	546	31	2,046
Southern Southeastern	11	340	263	17,081	387	18,082
Northern Southeastern	2	221	87	2,331	173	2,814
Yakutat	3	128	130	30	6	297
SOUTHEASTERN REGION SUBTOTAL	389	692	1,573	19,988	597	23,239
Prince William Sound	30	505	313	2,789	488	4,125
Cook Inlet	19	2,770	227	2,010	641	5,667
Kodiak	3	1,072	49	15,004	814	16,942
Chignik	2	1,576	20	985	120	2,703
South Peninsula	1	560	49	5,834	542	6,986
CENTRAL REGION SUBTOTAL	55	6,483	658	26,622	2,605	36,423
North Peninsula	14	896	54	446	163	1,573
Aleutian Islands	0	0	0	38	0	38
Bristol Bay	175	9,704	82	5,187	1,166	16,314
Arctic-Yukon-Kuskokwim	161	12	247	387	1,837	2,644
WESTERN REGION SUBTOTAL	350	10,612	383	6,058	3,166	20,569
TOTAL ALASKA	794	17,787	2,614	52,668	6,368	80,231

a/ Compiled 11/30/78

Again in 1978, as in 1977, chum salmon returns were weak. Chum catches were significantly below average throughout the region, with the exception of the Tree Point gill net fishery. The fall chum purse seine fishery remained closed to bolster lagging escapements.

Prince William Sound

Both pink and chum salmon runs appeared in Prince William Sound about a week earlier than usual, but the pink runs were weaker than had been anticipated. The late pink runs were stronger, and the total return of 3.8 million was close to the forecast of 4.2 million. Most of the catch came from the Northern and Eastern districts.

Chum salmon production came primarily from early and middle runs, and there was almost no deviation from the forecast return. Sockeye returns to the Coghill-Unakwik district were very strong and produced record catches with good escapements.

Sockeye harvests in the Copper River district were far below expectations, and the Bering River catch was below average. Sockeye escapement into Copper River delta streams was above average, and up-river escapement was only 40% below desired levels. A sonar fish counter was used for the first time to enumerate escapement in the Copper River and gave early indications of the weakness of the sockeye run.

Both chinook and coho harvests in the Copper River district were above average. The chinook catch, partly incidental to the sockeye fishery, was up in spite of fishing closures due to the weak sockeye run. The coho catch in both the Copper and Bering River districts was more than 50% above average.

Cook Inlet

Cook Inlet salmon harvests increased again in 1978 to 5.7 million fish. Catches of all species were at least average, and the sockeye harvest of 2.8 million set a record.

Pink salmon runs in the Southern and Outer districts were augmented by returns to the State hatchery at Tutka Bay. An estimated 120,000 hatchery pinks were taken by fishermen in that bay. Natural pink runs to streams of the lower Inlet were somewhat weaker than had been expected but excellent escapements were obtained at Port Dick, and pink returns to Rocky and Windy bays continued to improve.

Kodiak

Nearly 17 million salmon were harvested in the Kodiak area in 1978, almost double the average for the past 50 years. The 1978 catch brought more than 30 million dollars to the fishermen.

Of the 19 million returning pink salmon, 15 million were harvested, about 30% above the harvest forecast. Escapements ranged from good to excellent in almost all systems, and the total for the Kodiak management area of 4 million spawners was the largest ever recorded.

The sockeye catch exceeded 1 million for the first time in 30 years; earlier portions of the runs were particularly strong. Coho and chinook harvests were also better than average. Chum salmon, which are taken incidentally in pink salmon fisheries, were not exceptionally plentiful, but the chum harvest was increased because of extended pink salmon fishing openings.

Chignik

Both early and late Chignik sockeye runs were strong, as in 1977. Nearly 1.6 million were taken in the Chignik area, and about 250,000 by Kodiak and Alaska Peninsula fishermen. Escapement objectives were attained.

Pink salmon returns to western portions of the Chignik area were generally strong, while most eastern runs were weak. Pink harvests and escapements are continuing to improve, and the catch of nearly 1 million is the largest since 1969. Chum salmon runs are also recovering, but the 1978 harvest of 120,000 was still below average.

South Peninsula

The June fisheries of South Unimak and the Shumagin Islands harvested 490,000 sockeye salmon, slightly under the guideline set by the Board of Fisheries. The chum catch was relatively low at 120,000, but the harvest of 90,000 pink salmon was exceptionally large.

Local pink returns to the South Peninsula and Bechevin Bay were unexpectedly strong with a catch of 6 million and a 2.5 million fish escapement, which was well distributed. In contrast, the Unalaska pink runs were weak, with only 38,000 harvested. The local chum catch of 425,000 was average and escapements were generally good.

North Peninsula

Sockeye runs were exceptionally strong on the North Peninsula, with most of the returns occurring in the vicinity of Port Moller. The catch of 900,000 was the largest since 1956. Sockeye escapements to major systems near Port Moller were heavy.

The chum catch was average at 160,000, but escapements were below optimum.

Bristol Bay

An inshore return of nearly 20 million sockeye salmon yielded a sockeye catch of 9.7 million, about 50% above the forecast harvest. Escapement goals were met or exceeded in all systems except the Ugashik River. Good escapements achieved in 1974 and unusually high survival of progeny resulting from 1973 spawners contributed to the strong 1978 sockeye return.

Probably the most notable feature of the 1978 season was the large return of all salmon species to the Nushagak District. The sockeye return of 6.7 million fish was the largest for this district since 1918. The pink salmon run, 13.8 million fish, and the pink catch of 5.2 million were the highest on record.

The Bristol Bay chum salmon catch was 1.2 million in 1978, more than twice the long-term average. Chum escapement to all spawning areas was excellent. Similarly, the coho harvest of 80,000 was double that expected and the 180,000 chinook catch was the largest since 1919, with record escapements to primary spawning areas.

Arctic-Yukon-Kuskokwim

More than 2.6 million salmon were taken in Yukon, Kuskokwim, Kotzebue and Norton Sound commercial fisheries in 1978. Record summer chum catches were made in the Yukon River, and the region-wide chum salmon harvest of 1.9 million has been exceeded only once, in 1975. Catches of chinook salmon in the Yukon and Kuskokwim districts totaled 160,000, also better than average. The commercial harvest of chum salmon in the Kotzebue area was below average, apparently due to very poor survival of returns from the 1974 parent year.

PRELIMINARY FORECASTS OF THE 1979 SALMON RETURNS TO SELECTED ALASKAN FISHERIES

The Department's salmon management program includes a number of salmon return forecast projects. Forecast fisheries were selected using several criteria, including economic importance, feasibility, compatability with existing programs and management needs. Forecast fisheries are:

Southern Southeast	-	pink salmon
Northern Southeast	-	pink salmon
Prince William Sound	-	pink and chum salmon
Cook Inlet: Southern and Outer Districts	-	pink salmon
Kodiak	-	pink salmon
Chignik	-	pink and sockeye salmon
South Peninsula	-	pink salmon
Bristol Bay	-	pink and sockeye salmon

In 1978, more than three-quarters of the total statewide harvest was taken in these fisheries.

A variety of information is used to make salmon return forecasts, including escapement magnitudes and distribution, survival to intermediate life stages and population age composition. The return, with upper and lower limits, is predicted for each forecast fishery. In general, based on past experience, the actual return can be expected to fall inside the range (between the lower and upper limits) about 50% of the time. In 1978, 6 of the 11 returns forecast were inside their forecast ranges. The 1979 forecasts and ranges are summarized in Table 4.

Southeastern Alaska

A moderately strong pink salmon return to southern Southeast is expected in 1979, with a forecast harvest range of from 9.9 to 19.9 million. Pink salmon escapements were large and well-distributed in 1977, the

TABLE 4. PRELIMINARY FORECASTS OF SALMON RETURNS TO SOME MAJOR ALASKAN FISHERIES IN 1979.

(Number of fish in thousands)

AREA	Species	Forecast return	Escapement goal	Estimated harvest	Forecast[a] return range	Estimated harvest range
Southern Southeastern	Pink	15,400	6,000	9,400	9,900 - 19,900	3,900 - 13,900
Northern Southeastern	Pink	9,200	4,000	5,200	5,500 - 12,900	1,500 - 8,900
Southeastern Total	Pink	24,600	10,000	14,600	15,400 - 32,800	5,400 - 22,800
Prince William Sound	Pink	8,400	1,700	6,800	6,700 - 10,200	5,000 - 8,500
	Chum	360	250	110	10 - 710	0 - 460
Cook Inlet-Southern and Outer Districts	Pink	1,500	280	1,400	750 - 2,200	630 - 2,100
Kodiak	Pink	13,200	2,000	11,200	10,800 - 15,500	8,800 - 13,500
Chignik	Pink	2,600	700	2,100	1,500 - 3,700	1,000 - 3,200
	Sockeye	2,100	650	1,500	1,900 - 2,300	1,200 - 1,600
South Peninsula	Pink	9,500	1,300	6,300	7,900 - 11,100	4,700 - 7,900
Bristol Bay, Nushagak District	Pink[c]					
Bristol Bay	Sockeye	22,700	9,500	13,200	8,400 - 37,300	0 - 27,800
TOTAL		84,960	26,380	57,210		

a/ The forecasted return and harvest ranges are estimated by several techniques. Based on past experience, about 50% of the realized returns and harvests can be expected to fall within their respective ranges.

b/ Inshore harvest only.

c/ Pink salmon returns to Bristol Bay in odd-numbered years are negligible.

parent year, but high temperatures and low water in both northern and southern areas may reduce returns. Further improvements in northern pink runs are anticipated in 1979, with an expected harvest of 5.2 million.

Prince William Sound

Natural pink salmon returns to Prince William Sound are expected to allow a harvest of at least 5.5 million fish, probably not more than 8.5 million. Pink runs in all districts except the Northern should be strong enough to permit fishing. Pink salmon returning to the Prince William Sound Aquaculture Corporation hatchery will probably contribute about 200,000 additional fish to the common property fishery. The forecast natural chum salmon return of 360,000 is expected to allow a catch of about 100,000 fish.

Cook Inlet -- Southern and Outer Districts

The 1977 parent-year pink salmon escapement in the Southern and Outer Districts of the Cook Inlet area was the highest on record, but most of the 1979 return is expected to be to the Outer District. A harvest of from 600,000 to 2.1 million pinks, including some fish returning to the State hatchery at Tutka Lagoon, is expected.

Kodiak

The Kodiak pink salmon harvest is expected to be from 8.8 to 13.5 million fish, a larger-than-average odd-numbered year catch. Parent-year escapement was excellent and resulting pre-emergent fry densities were high.

Chignik

A moderate increase in Chignik pink salmon returns is forecast in 1979, to 2.6 million fish from 1.9 million in 1978. The anticipated harvest range is from 1 to 3.2 million pinks. Chignik sockeye catches are expected to equal those in 1978, about 1.5 million.

South Peninsula

Another strong pink salmon return to the south side of the Alaska Peninsula is forecast for 1979. Nearly 10 million pinks are expected, which should allow a harvest of from 4.7 to 7.9 million fish.

Bristol Bay

The Bristol Bay sockeye harvest is expected to exceed 13 million in 1979, up from 9.7 million in 1978. Bristol Bay pink salmon runs are negligible in odd-numbered years.

PROJECTED 1979 ALASKAN COMMERCIAL SALMON HARVESTS

Projections of the 1979 Alaskan commercial salmon harvest by statistical region and species are presented in Table 5. The projections are composed of forecast harvests and harvest projections (recent harvest averages, sometimes modified if additional information is available), for fisheries without forecasts. Chinook and coho returns are not forecast in any region, and Prince William Sound, in the Central Region, has the only chum forecast. All regions have pink salmon forecasts, but several smaller pink runs are not forecast. Major sockeye runs in the Central and Western Regions are forecast; important exceptions are Copper River, Cook Inlet and Kodiak. Despite these gaps, 76% of the 1978 salmon harvest of 80 million fish was taken in forecast fisheries.

The 1979 statewide total commercial harvest projection is 72.0 million salmon.

Species Outlook

Pink Salmon

60% of the 1979 statewide total harvest projection, or 43 million fish

66% of the 1978 statewide total harvest, or 53 million fish

Pink salmon runs in the Western statistical region are negligible in odd-years, which accounts for part of the projected 18% decline in the statewide pink harvest, from 53 to 43 million. Pink catches in southern Southeast Alaska are expected to be down sharply, from 17 million fish in 1978 to 9.4 million in 1979. A small increase is projected for the Central region.

TABLE 5. PRELIMINARY PROJECTIONS OF 1979 ALASKAN COMMERCIAL SALMON HARVESTS BY REGION AND SPECIES, AND PROJECTED STATEWIDE SALMON PRODUCTION BY SPECIES[a/].

(Number of fish in thousands)

STATISTICAL REGION	SPECIES					
	Chinook	Sockeye	Coho	Pink	Chum	All
Southeastern	320	800	800	14,600	1,300	17,820
Central	50	4,900	570	28,400	2,800	36,720
Western	290	13,900	320	200	2,800	17,510
TOTAL ALASKA	660	19,600	1,690	43,200	6,900	72,050
Total production, thousands of pounds[b/]	7,500	84,000	13,000	99,000	45,000	248,500

a/ Compiled 11/4/78. The projected 1979 harvests were obtained by summing harvest forecasts (Table 4) and harvest projections in the remaining fisheries.

b/ Including canned, cured, fresh and frozen salmon and roe.

Sockeye Salmon

27% of the 1979 statewide total harvest projection, or 20 million fish

22% of the 1978 statewide total harvest, or 18 million fish

A 10% increase in the statewide sockeye catch is expected. Moderate declines in the Central Region are matched with increases in other regions. An increase of 30% is anticipated in the Bristol Bay sockeye harvest, from 10 to 13 million fish.

Chum Salmon

10% of the 1979 statewide total harvest projection, or 6.9 million fish

8% of the 1978 statewide total harvest, or 6.3 million fish

Despite the projected 130% increase in Southeast Alaska chum catches, which have been depressed recently, the statewide chum take is expected to be up by less than 10%. The Western Region chum harvest has been relatively large in recent years, and further increases are thought unlikely; in fact a 12% decline is projected for that region.

Coho Salmon

2% of the 1979 statewide total harvest projection, or 1.7 million fish

3% of the 1978 statewide total harvest, or 2.3 million fish

Chinook Salmon

1% of the 1979 statewide total harvest projection, or 660,000 fish

1% of the 1978 statewide total harvest, or 800,000 fish

Moderate declines are expected in both chinook and coho catches in 1979, particularly in Southeastern Alaska, where harvests of these species were up strongly in 1978.

Regional Outlook

Statewide

1979 statewide total harvest projection: 72.0 million fish

1978 statewide total harvest: 80.2 million fish

Decreases in statewide catches of chinook, coho and pink salmon are not expected to be balanced by projected increases in sockeye and chum harvests. A 10% decline, from 80 million fish in 1978 to 72 million in 1979, is anticipated.

Southeastern Region

25% of the 1979 statewide total harvest projection, or 18 million fish

29% of the 1978 statewide total harvest, or 23 million fish

In Southeastern Alaska, harvests of pink, chinook and coho salmon are expected to be smaller in 1979. The total catch is projected to drop by 23%, to 18 million fish.

Central Region

51% of the 1979 statewide total harvest projection, or 37 million fish

45% of the 1978 statewide total harvest, or 36 million fish

Very little change is projected for Central Region salmon harvests overall. The small expected increase in pink and chum salmon catches is matched by projected decreases in catches of other species.

Western Region

24% of the 1979 statewide total harvest projection, or 18 million fish

26% of the 1978 statewide total harvest, or 21 million fish

Taking into account negligible pink salmon runs in the Western Region in odd-numbered years, the only noteworthy difference projected for the Western Region in 1979 is an increase of 3 million fish in the Bristol Bay sockeye harvest. Small decreases are expected in catches of other species.

DISCUSSION

Commercial salmon harvests in Alaska have steadily increased since 1974, when the statewide catch struck bottom at 22 million fish. Now, after the record-breaking 1978 harvest of 80 million salmon, the largest since 1943, the Department projects a modest decline to 72 million fish in 1979. With due regard for the recent tendency of Department harvest projections to underestimate realized catches -- projections have fallen short of the actual catches for each of the past five years, by an average of 24% of the realized catch -- an upward correction might seem appropriate. A deficit of 24% of the realized catch means that, on the average, since 1974, the projection only represented 76% of the realized catch. Dividing the 1979 projection by 0.76 suggests, as a corrected projection, 95 million fish.

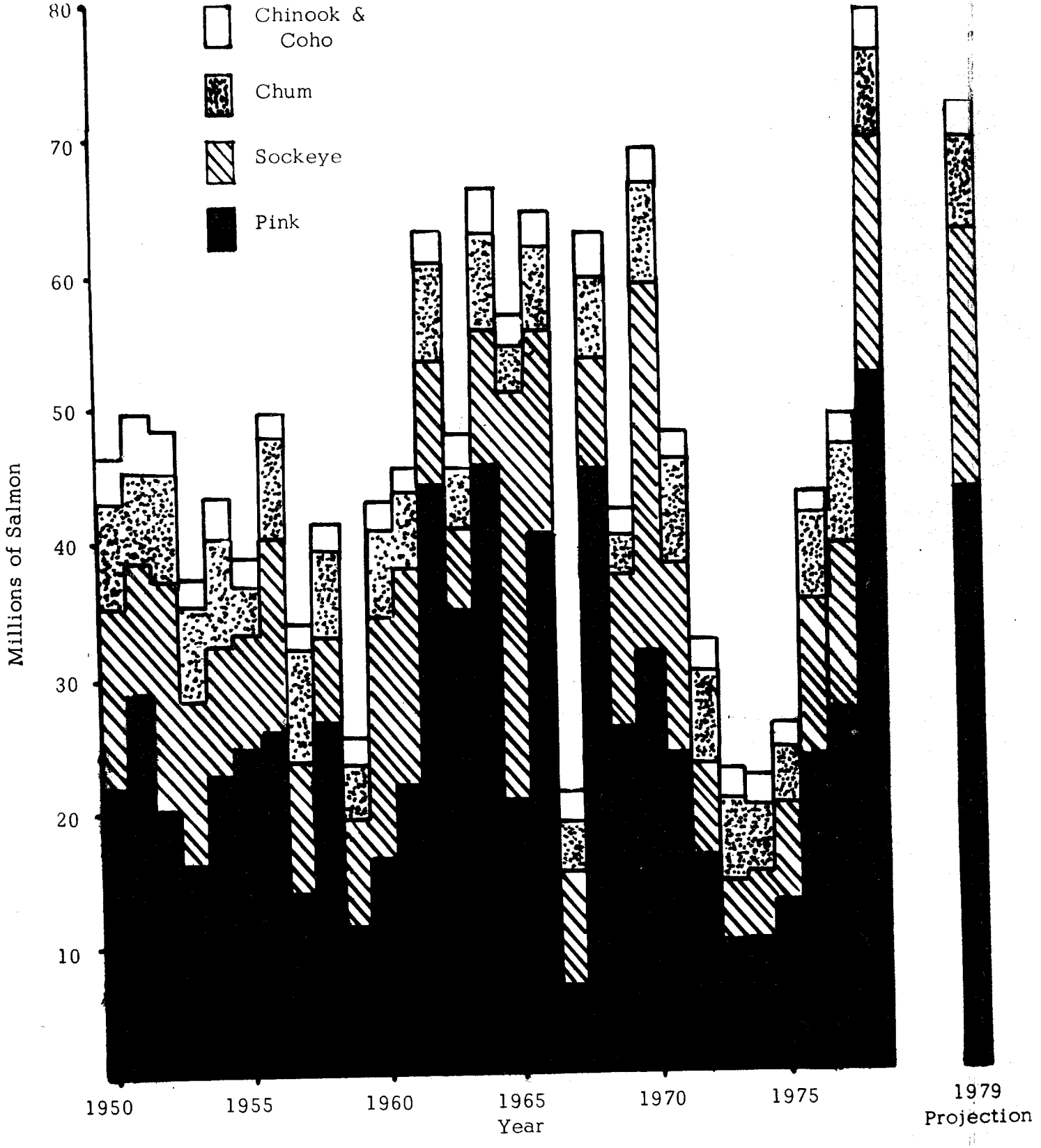
A study of Figure 2, which shows the pattern of Alaska's commercial salmon harvest by species since 1950, certainly does not unearth any visible long-term trends, either up or down. There are two recent short-term trends: one down, from 1970 through 1973, and the other up, from 1974 through the present. On the way down, projections tended to exceed realized harvests, on the average, by 26%. During this period, the projection represented 126% of the realized harvest, suggesting a corrected 1979 projection of 57 million fish. A harvest of this magnitude would still exceed the 51 million fish average recorded during the 1960's.

The net result of the optimistic projections for 1970-1973 harvests, and the more pessimistic recent projections, is a practically negligible 3% underestimate. While a 1979 harvest falling anywhere in the range between 50 and 100 million fish would not be surprising, the Department's projection of 72 million does not appear to be biased.

The recovery of Alaska's commercial salmon fisheries from the depressed levels of the mid-1970's has been very rapid, approaching a compound growth rate of 40% annually. While this recovery was certainly encouraged by recent warmer weather, it could not have occurred without the escapements obtained in 1973, 1974, and 1975 when fewer than 30 million salmon were harvested. Fishing restrictions on smaller runs during that period were necessarily severe, but the results, in terms of run recovery, have been phenomenal. In nearly all areas of the state, salmon returns have increased to or above levels experienced in the 1960's.

If environmental conditions continue to promote average or better-than-average salmon survival, and the Department is allowed to continue its improvement in management capability through the funding of important new technological applications, the coming decade should bring a consolidation and improvement in the status of Alaska's salmon runs.

Figure 2. Alaskan commercial salmon harvests by species, 1950-1978, and the 1979 projected harvest.



APPENDIX. FORECAST METHODS AND DISCUSSIONS

FORECAST AREA: Southeastern Alaska

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1979 RETURN:

Southern Southeast

Point Estimate: 15.4 million

Range Estimate: 9.9 million - 19.9 million

Northern Southeast

Point Estimate: 9.2 million

Range Estimate: 5.5 million - 12.9 million

Total Southeastern Alaska

Point Estimate: 24.6 million

Range Estimate: 15.4 million - 32.8 million

FORECAST METHODS

Separate forecasts are prepared for the pink salmon return to northern and southern Southeast Alaska due to the difference in migration routes and other population characteristics of the pink salmon returning to the two areas. The southern Southeast forecast for 1979 is based on a multiple regression analysis of the pre-emergent fry index, the average annual air temperature for 15 stations located throughout Southeast Alaska, and an index of fry fitness. The 1979 northern Southeast forecast was calculated using the pre-emergent fry index and the same annual temperature average used for the southern Southeast forecast. A number of forecast formulas were examined but none appeared as accurate as the two used.

DISCUSSION OF THE 1979 FORECAST

Pink salmon escapements to the southern districts were excellent in the 1977 parent year but warm weather and low water in August seriously

affected the success of some spawners. The escapement index was the highest since the pre-emergent fry sampling program was begun, but the resulting fry index was low by comparison -- only 3 have been lower since brood year 1965. The final effect of the drought in August is very difficult to assess but without question it lowered the pre-emergent fry values observed, particularly in districts 3, 5 and 6. The fry values in districts 1, 2 and 6 were nearly as high as or higher than those from 1976 escapements. The return from these districts, however, is not expected to be as large as the return from the 1976 brood because environmental conditions were not as favorable. Run timing may be somewhat later in 1979 because low water affected the success of early spawners and forced some middle-run pinks to spawn late.

Pink salmon returns to the northern districts should improve in 1979. The overall 1977 escapement index of 3.86 million was one of the best since statehood. The pre-emergent fry index was higher than any since the 1966 brood year, with districts 12 and 13 showing particularly strong values. The 9.2 million forecast suggests a return of 2.4 pinks per index spawner which is somewhat below the average ratio of 2.9 to 1 so it certainly is possible that the return may fall in the upper end of the range. The distribution of the return to northern Southeast is expected to be uneven with little or no harvest in districts 10 and 11. The strength of the run will probably be in district 13 on the outside of Chichagof Island, with some harvestable surplus showing in district 12 and possibly district 14. The timing of the run is likely to be fairly uniform.

Prepared by: Doug Jones
Fisheries Research Biologist
Juneau

FORECAST AREA: Cook Inlet, Southern and Outer Districts

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1979 RETURN:

NATURAL PRODUCTION

Point Estimate: 1.5 million

Range Estimate: 750,000 - 2.2 million

SUPPLEMENTAL PRODUCTION

Point Estimate: 160,000

Range Estimate: 160,000 - 250,000

TOTAL PRODUCTION

Point Estimate: 1.7 million

Range Estimate: 900,000 - 2.5 million

FORECAST METHODS

The 1979 pink salmon forecast for the Southern and Outer districts of Cook Inlet is derived from a linear regression between indices of pre-emergent fry densities in nine major spawning streams and the subsequent adult returns. Pre-emergent fry abundance is determined from these streams each spring and is weighted by the average escapement for that stream. The resultant individual stream indices are combined to yield a single weighted pre-emergent fry index for all nine streams.

The Tutka Lagoon pink salmon hatchery released 2.9 million short-term reared fry and 1.9 million unreared fry in 1978. Past reports have applied 4 percent and 2 percent survival rates respectively for purposes of estimating adult pink salmon returns. The total pink salmon return to the hatchery is estimated to be 160,000, but could be as high as 250,000.

DISCUSSION OF FORECAST

The 1977 pink salmon escapement of 361,000 was the highest on record and over twice the average of 172,000 since 1964. Although fry densities were excellent in most streams, the majority of the 1979 pink salmon return should be to the Port Dick, Windy Bay and Rocky Bay areas of the Outer District.

Two other calculations were made which complement the standard forecast. Using unweighted average fry densities results in a return estimate of 1.4 million and using the average return-per-spawner of 4.61 gives a forecast estimate of 1.7 million.

Although the fry densities and return-per-spawner data indicate a very strong run, other factors could have lowered marine survival. Fry from all spawning streams emerged 4 to 6 weeks earlier in 1978 than during most years. If adequate food was not available, a very high mortality could have occurred during early estuarine residence. Furthermore, a much larger return to the Tutka Lagoon facility may occur due to the higher survival rates being observed on returns from short-term reared fry.

Prepared by: Thomas R. Schroeder
Area Biologist
Homer

FORECAST AREA: Prince William Sound

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1979 RETURN:

NATURAL PRODUCTION

Point Estimate: 8.1 million

Range Estimate: 6.5 million - 9.7 million

SUPPLEMENTAL PRODUCTION

Point Estimate: 340,000

Range Estimate: 170,000 - 510,000

TOTAL PRODUCTION

Point Estimate: 8.4 million

Range Estimate: 6.7 million - 10.2 million

FORECAST METHODS

Natural Production: Pre-emergent fry indices provide the basis for the Prince William Sound pink salmon forecast. These indices are collected yearly from a standard set of streams and sample zones to insure comparable data for between-year comparisons. The 1979 forecast and range were obtained from a linear regression analysis relating odd-numbered year returns (1967 through 1977) to the brood-year fry index. The 1964 Alaska earthquake severely depressed even-year production while odd-year production remained relatively stable. In addition, spawner distribution differs between odd-year and even-year runs with the odd-year runs having a larger average percentage of spawners in the freshwater zone (50% intertidal and 50% freshwater) while even-year distribution averages 75% intertidal and 25% freshwater. The spawning distribution affects egg to fry survival and the pre-emergent fry sampling schedules and forecast index weighting methods employed.

The 1979 Prince William Sound pink salmon forecast is the largest since 1962, the year the program was initiated, when a return of 8.9 million fish was predicted. The total return for that year was 8.7 million fish. Since the 1964 earthquake the largest odd-year forecast

was 6.3 million (for the 1977 year of return) while the largest odd-year total return was 9.5 million fish in 1971.

Supplemental Production: The pink salmon return to the Prince William Sound Corporation hatchery in 1979 is from a release of nearly 17 million fry in April and May, 1978. Some fry emerging in February and March were retained and fed. A 2% fry-to-adult survival rate was assumed for the entire group.

DISCUSSION OF THE 1979 FORECAST

Natural Production: The 1979 return is the result of an estimated brood-year escapement of 1.7 million. The resultant pre-emergent fry index was 343 fry per square meter. The estimated return of 8.1 million fish is based on odd-year returns for the years from 1967 to 1977. The forecasted range of 6.5 million to 9.7 million fish represents 80 percent confidence and is based on exhibited variance between past post-earthquake odd-year forecasts and total returns.

The commercial harvest point estimate is 6.6 million fish with a range of from 5.5 million to 8.2 million fish. The catch figures are based on an estimated escapement requirement of 1.5 million fish.

Harvestable returns are expected in all districts with the exception of the Northern district which has been experiencing weak odd-year returns. For the first time since 1973 the middle and southern portions of the Montague district should be open to commercial fishing.

Based on brood year return timing the 1979 return is expected to be strong in the early and middle segments with the late return exhibiting sufficient strength to allow fishing.

Supplemental Production: Returns to the Prince William Sound Aquaculture Corporation's hatchery at San Juan on Evans Island are expected to occur during the period from July 25 to August 30. Total return to the Corporation's hatchery is expected to be 340,000. With hatchery requirements of 157,000 fish the common property fishery is expected to harvest about 180,000 of these fish.

A breakdown of the total hatchery return is as follows:

I. Brood stock for hatchery seeding at a 60 million egg level requires 37,000 females and 13,000 males, or a total of 50,000 adults (15% of the total return).

II. Corporation fish sales to cover annual operating expenses (107,000 fish, or 32% of the total return).

III. Common property fishery catches of 180,000 fish (53% of the total return).

SPECIES: Chum Salmon

PRELIMINARY FORECAST OF 1979 RETURN:

NATURAL PRODUCTION

Point Estimate: 360,000

Range Estimate: 10,000 - 700,000

SUPPLEMENTAL PRODUCTION

No supplementally produced chum salmon are expected to return to the Prince William Sound Aquaculture Corporation hatchery.

FORECAST METHODS

Chum salmon forecast methods are similar to those used for pink salmon. The exceptions are: 1) a different stream list is used, 2) no index weighting methods are used regarding intertidal and upstream spawners and 3) the chum salmon forecast is based on the average percentage contribution of 4-year-old fish. After determining the 4-year-old return that number is expanded to include all age classes by dividing the 4-year-old forecast by the average age-4 contribution to annual returns. Chum salmon mature at 3, 4, 5 and, to a small extent, 6 years of age. The average age-4 contribution used for the 1979 forecast was 74%.

DISCUSSION OF THE 1979 FORECAST

The 1974 brood year, which is expected to contribute the major portion of the 1979 return, had an estimated escapement of 47,000. This escapement produced a pre-emergent fry index of 32 fry per square meter, which results in a forecasted return of 360,000 fish with a forecasted range of from 10,000 to 700,000 fish at 80 percent confidence limits.

The expected harvest is 110,000 fish based on a desired escapement of 250,000 fish.

Both brood year escapement and pre-emergent fry levels indicate that most of the 1979 return will be bound for the Eastern district. Smaller contributions to the return could be made by the Coghill and Southeastern districts.

Prepared by: Michael L. McCurdy
Fisheries Research Biologist
Cordova

FORECAST AREA: Kodiak

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1979 RETURN:

Point Estimate: 13.2 million

Range Estimate: 10.8 million - 15.5 million

FORECAST METHODS

The 1979 pink salmon forecast return to the Kodiak Management Area was determined as follows: For the Kodiak - Afognak Island complex a linear regression relating fourteen consecutive years of pre-emergent fry densities and subsequent adult returns was used to establish a point estimate; the range estimate is an 80% confidence interval about the point estimate. To this was added the expected return to the Mainland district, derived by multiplying the average return-per-spawner for this district by its brood year escapement.

DISCUSSION OF THE 1979 FORECAST

Pre-emergent fry sampling indicated generally good to excellent winter survival from a well-distributed brood year escapement 82% above the odd-numbered year average. Sampling yielded an unweighted index of 212 fry per square meter, a 70% increase above the average odd-year index of 125 and one which exceeds all other densities for odd-year returns, including the index of 199 which resulted in the excellent 1969 return of 13.8 million pinks.

Brood-year escapement to the index streams was 65% of the total as compared to the odd-year average of 76%. Thus, with a significant portion of the brood year escapement occurring in unsampled streams, where production is usually more variable, a slightly lower return-per-spawner could occur in 1979 than would have been expected.

Estuarine rearing conditions in the spring and early summer of 1978 appeared favorably comparable to conditions experienced during the past five years; in most bays desirable water temperatures during the fry outmigration period occurred about a week earlier than for the past two years, when estuarine fry survival was considered very good.

For 1979, 10.8 to 15.5 million pink salmon are expected to return to the Kodiak Management Area. With a desired escapement goal of 2.0 million, a harvest of 8.8 to 13.5 million is expected.

A breakdown of the expected return by major geographical district is summarized below. Comparisons are made between the good 1977 brood year return and the excellent 1969 return. All district catch projections assume desired escapement goals will be met.

Afognak District: Pre-emergent fry survival was only fair from a fairly good brood-year escapement with the sampled streams receiving 56% of the district escapement. The district fry density was below densities for both the brood year and the 1969 returns by 52% and 54% respectively. District natural production should be approximately 6% of the total area return. Danger Bay and some north-end bays will provide much of this local natural production. The desired escapement requirement is 150,000, and a harvest of from 540,000 to 860,000 is expected. Supplemental production from the Kitoi Bay hatchery is expected to add approximately 140,000 fish to the harvest.

Westside District: Pre-emergent fry survival was fairly good from a very good brood-year escapement with the sampled streams receiving 57% of the district escapement. The district fry density was below the density for the brood year return and above the density for the 1969 return by 16% and 14% respectively. District production should be approximately 24% of the total return, with Uyak Bay systems providing much of the production. The desired escapement requirement is 400,000, and a harvest of from 2.2 to 3.5 million is expected.

Alitak District: Pre-emergent fry survival was very good from an excellent brood-year escapement with the sampled streams receiving 82% of the district escapement. The district fry density exceeded densities for both the brood year and the 1969 return by 49% and 29% respectively. District production should be approximately 23% of the total return, with Deadman and Humpy Rivers being the major production systems. The desired escapement requirement is 400,000, and a harvest of from 2.0 to 3.1 million is expected.

General District: Pre-emergent fry survival was generally excellent from an excellent brood-year escapement with the sampled streams receiving 63% of the district escapement. The district fry density exceeded densities for both the brood year and the 1969 returns by 8% and 2% respectively. District production should be approximately 39% of the total return, with good production occurring everywhere except in Kiliuda Bay systems. The desired escapement requirement is 650,000, and a harvest of 3.4 to 5.4 million is expected.

Mainland District: Pre-emergent fry survival was very good from an excellent brood-year escapement with the sampled streams receiving 87% of the district escapement. The district fry density exceeded all past year's densities. District production should be approximately 8% of the total return, with most of the production coming from the Dakavak and Wide Bay sections. The desired escapement requirement is 400,000, and a harvest of 700,000 is expected.

Prepared by: Larry Malloy
Assistant Area Finfish Biologist
Kodiak

FORECAST AREA: Chignik

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1979 RETURN:

Point Estimate: 2.6 million

Range Estimate: 1.5 million - 3.7 million

FORECAST METHODS

The 1979 pink salmon forecast for the Chignik area was based on the relationship between pre-emergent fry densities and adult returns. The mean odd-numbered year return-per-spawner established a low end for the forecast range while the highest return-per-spawner, with comparable climatic conditions, composed the upper end.

DISCUSSION OF THE 1979 FORECAST

Eastern & Central District: District pre-emergent densities were the highest ever recorded. Major escapement contributors were Cape Kumlium, Thompson Valley, Hook Bay and Chiginagak. The parent-year escapement for this district was 275,000. The anticipated district harvest is 300,000 to 1.0 million pinks, with an escapement of 300,000 to 400,000.

Western District: District pre-emergent fry densities were high in all systems, with the exception of Coal Cape. Major escapement contributors were Ivan River, Coal Cape and Foot Bay. The parent year escapement for this district was 356,000 pink salmon. The district harvest is expected to be 500,000 to 1.7 million with a minimum escapement of 200,000.

Perryville District: District pre-emergent fry densities were the highest recorded since 1971. Major escapement contributors were Ivanof River and Humpback River. The total district escapement was 115,000 pink salmon. The anticipated district harvest is 200,000 to 500,000 with an escapement of 100,000 to 200,000.

Prepared by: Larry Nicholson
Stock Separation and Enumeration
Kodiak

FORECAST AREA: Chignik

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF 1979 RETURN:

Point Estimate: 2.1 million

Range Estimate: 1.9 million - 2.3 million

FORECAST METHODS

A linear regression relating the number of sockeye returning after spending 2 years in the ocean (2-ocean fish) to the number of 3-ocean fish the following year was employed. Data from 1950 through 1977 were used, excluding 1963, 1964 and 1969 when inadequate age class data was collected or escapement estimates were imprecise.

The average number of 2-ocean sockeye returning during the years 1970 through 1978, excluding the highest and lowest year, is added to the predicted number of 3-ocean fish. The reason for utilizing only recent data is that the runs appear more productive now than in previous years. Due to the high productivity of the late run it is unlikely that the number of 2-ocean fish will be small, but it also seems unlikely to approach the unusually high return of 2-ocean fish experienced in 1976.

DISCUSSION OF THE 1979 FORECAST

Early run: Using essentially the same methods as applied to the total run forecast an early run of 1.0 million sockeye is predicted for 1979, with 800,000 3-ocean and 200,000 2-ocean fish. In an attempt to correct for sub-optimal escapement in 1975, the 2 highest years were omitted in calculating the 2-ocean average. The early run harvest is expected to range from 400,000 to 600,000.

Late run: The 2-ocean to 3-ocean regression has never worked well in predicting the late Chignik sockeye run. The prediction for 1979 was derived by subtracting the early run forecast from the total run forecast. The late run harvest should range from 800,000 to 1.1 million.

Prepared by: Arnold Shaul
Chignik Area Biologist
Kodiak

FORECAST AREA: South Peninsula

SPECIES: Pink Salmon

PRELIMINARY FORECAST OF 1979 RETURN:

Point Estimate: 9.5 million

Range Estimate: 7.9 million - 11.1 million

FORECAST METHODS

A standard simple linear regression analysis relating pink salmon return to a brood-year pre-emergent fry index provided the forecast point estimate. The pre-emergent fry indices were derived from data for six key streams, each with eight years of pre-emergent fry sampling history. The return range estimate was estimated utilizing the relationship between average ambient air temperatures and return-per-spawner ratios.

DISCUSSION OF THE 1979 FORECAST

The average pre-emergent fry index for all sampled streams was 21% higher than in 1977, indicating excellent egg-to-fry survival. Utilizing return-per-spawner data with similar climatic conditions produced a probable return/spawner ratio range of 3.7 to 5.3. Ambient air temperatures (March through June) were the second highest recorded since 1961, suggesting good estuarine survival. Applying the above-mentioned return/spawner range to the 1977 escapement of 2.1 million gives a South Peninsula return range of 7.9 to 11.1 million pink salmon.

Southeastern District: District pre-emergent fry densities were above average. Survival appeared excellent due to a mild winter and minimal scouring by ice. Major contributors to this district's return will be Squaw Harbor, Grub Gulch, Orzinski, Chichagof and Little Harbor. With minimal escapement requirements of 500,000 a harvest of from 1.2 to 2.0 million pinks is expected.

Southcentral District: District pre-emergent fry densities were good to excellent. The major contributors will be Mino Creek, Settlement Point, Middle Creek, Canoe Bay South and Canoe Bay River. With minimal escapement requirements of 400,000 a harvest of 3.0 to 4.4 million pinks is expected.

Southwestern District: District pre-emergent fry densities were higher than average. The major contributors will be Belkofski Village, Deer Islands and Volcano. With minimum escapement requirements of 400,000 a harvest of 500,000 to 1.5 million is expected.

Prepared by: Larry Nicholson
Stock Separation and Enumeration
Kodiak

FORECAST AREA: Bristol Bay

SPECIES: Sockeye Salmon

PRELIMINARY FORECAST OF 1979 RETURN:

Point Estimate: 22.7 million

Range Estimate: 8.4 million - 37.3 million

FORECAST METHODS

Most Bristol Bay sockeye salmon mature 4 to 6 years from the time of spawning. The run in 1979 will, therefore, be the progeny of the escapements of 1973, 1974, and 1975. The total Bristol Bay forecast is the sum of the forecasts of individual river systems, each based on one or more of the following methods:

(1) Escapement-return relationships, based on historical data, provide estimates of total production from each brood-year escapement. Average marine maturity schedules are then applied to estimate the numbers of adult salmon returning each year.

(2) On the Kvichak and Wood Rivers, numbers of smolt migrating to the ocean are enumerated annually. The return of adult salmon each year is estimated using these smolt counts, past survival data and average maturity schedules.

(3) For each river system, relationships between the number of adult fish returning in a particular year and the number of adult fish from the same parent escapement and freshwater age group that will return the following year are utilized.

To aid in the selection of forecast techniques a measure of residual variance, the standard error of forecast, is calculated for each method, age class and system.

DISCUSSION OF THE 1979 FORECAST

The pre-season forecast of the 1979 Bristol Bay sockeye salmon return is 22.7 million. No projection of the 1979 Japanese high

seas mothership catch of Bristol Bay sockeye salmon has been made, however this catch is expected to be negligible. The 1978 Japanese high seas catch of 243,000 immature Bristol Bay sockeye salmon which would have returned in 1979 has been deducted from the forecast return.

Escapement requirements for Bristol Bay in 1979 total 9.5 million sockeye salmon, consistent with the Kvichak River pre-peak cycle escapement strategy of 6 million spawners. Analysis of the projected inshore run by system suggests a harvestable surplus of 13.2 million which is 8.7 million above the past average harvest for similar pre-peak cycle years since 1959. Significant harvests are expected in all of the Bay's commercial fishing districts. However, forecast returns to the Ugashik system are being viewed with considerable caution as recent returns have tended to be below forecast levels. Point estimates of allowable harvest by district in descending order of magnitude are: Naknek-Kvichak 7.7 million, Nushagak 3.1 million, Egegik 1.6 million, Ugashik 480,000 and Togiak 370,000.

Inshore returns are expected to be composed of 75% two-ocean and 25% three-ocean sockeye.

SPECIES: Pink Salmon

Pink salmon returns to the Nushagak District of Bristol Bay are negligible in odd-numbered years.

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